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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/725,959	11/30/2000	Jong-Woo Shin	Q61266	8642

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EXAMINER

SHAPIRO, LEONID

ART UNIT PAPER NUMBER

2673

DATE MAILED: 07/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/725,959

Applicant(s)

SHIN ET AL.

Examiner

Leonid Shapiro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the difference between Fig.3 and Fig. 8 as described in the specification. They look like the same and do not illustrate any advantages over the prior art. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: The applicant is required to explain why different formulas used on page 2 and 7 to calculate efficiency and optical loss. On page 2 after "...cos2..." multiplication sign need to be inserted.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-13 rejected under 35 U.S.C. 103(a) as being unpatentable over Hornbeck (US Patent No. 6,323,982 B1) in view of Tang et al. (US Patent No. 5,025,346).

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As to claim 1, Hornbeck teaches about a micro-mirror device for an image display apparatus with:

- substrate (See Fig. 4, 5, item 304, in description See Col. 7, Line 34)
- a landing pad (bias/reset structure) provided on the substrate (See Fig. 4, item 312, in description See Col. 7, Line 44)
- a pair of base (address) electrodes provided on opposite sides of the landing pad (See Fig. 4, 5, item 310, in description See Col. 7, Lines 44-45)
- a pair of first posts (the torsion beam support posts) that protrude from an upper surface of the landing pad (bias/reset structure), which are isolated from each other by the by a predetermined interval (See Fig. 4, 5, item 116, in description See Col. 9, lines 1-2)
- a girder (torsion hinge yoke) supported by the pair of the first posts (the torsion beam support posts), which is operative to pivot toward sides of the base (address) electrodes (See Fig. 4, 5, item 114, in description See Col. 7, Lines 53-54)
- a second post (mirror support spacer) protruding from an upper surface of the girder (torsion hinge yoke) (See Fig. 4, 5, item 326, in description See Col. 9, Lines 32-33)

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- a mirror supported by the second post (mirror support spacer) ,
which reflects incident light, and receives power via the landing
pad (bias/reset structure) (See Fig. 4, 5, item 102, in description
See Col. 7, Line 54)

Hornbeck does not show the mirror is pivoted toward the sides of the landing pad
(bias/reset structure) by an electrostatic attraction between the pair of the base (address)
electrodes and the mirror.

Tang et al. teaches how to drive an actuator in parallel to a substrate (See Fig. 1-3, items
36-38, in description See Col. 5, Lines 63-68 and Col. 4, Lines 51-53). It would have been
obvious to the one ordinary skill in the art in the time of invention to use Tang et al. approach in
the Hornbeck apparatus in order to reduce optical losses and relief of build-in residual strain.

As to claims 10-12, Hornbeck teaches about an image display device with a plurality
micro-mirror devices (See Fig. 3, item 100, in description See Col. 7, Lines 26-28), wherein each
of the plurality of micro-mirror devices has:

- substrate (See Fig. 4, 5, item 304, in
description See Col. 7, Line 34)
- a landing pad (bias/reset structure) provided on the substrate (See
Fig. 4, item 312, in description See Col. 7, Line 44)
- a pair of base (address) electrodes provided on opposite sides of
the landing pad (See Fig. 4, 5, item 310, in description See Col. 7,
Lines 44-45)

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- a pair of first posts (the torsion beam support posts) that protrude from an upper surface of the landing pad (bias/reset structure), which are isolated from each other by the by a predetermined interval (See Fig. 4, 5, item 116, in description See Col. 9, lines 1-2)
- a girder (torsion hinge yoke) supported by the pair of the first posts (the torsion beam support posts), which is operative to pivot toward sides of the base (address) electrodes (See Fig. 4, 5, item 114, in description See Col. 7, Lines 53-54)
- a second post (mirror support spacer) protruding from an upper surface of the girder (torsion hinge yoke) (See Fig. 4, 5, item 326, in description See Col. 9, Lines 32-33)
- a mirror supported by the second post (mirror support spacer) , which reflects incident light, and receives power via the landing pad (bias/reset structure) (See Fig. 4, 5, item 102, in description See Col. 7, Line 54)

Hornbeck does not show the mirror is pivoted toward the sides of the landing pad (bias/reset structure) by an electrostatic attraction between the pair of the base (address) electrodes and the mirror.

Tang et al. teaches how to drive an actuator in parallel to a substrate (See Fig. 1-3, items 36-38, in description See Col. 5, Lines 63-68 and Col. 4, Lines 51-53). It would have been obvious to the one ordinary skill in the art in the time of invention to use Tang et al. approach in

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the Hornbeck apparatus in order to reduce optical losses and relief of build-in residual strain. An actuator of Tang et al. would be implemented to mount the mirror in the Hornbeck apparatus.

As to claim 13, Hornbeck teaches about a method of reflecting light using a micro-mirror device in an image display apparatus with supplying a driving voltage to at least one of the pair of base (address) electrodes of the micro-mirror device, and altering the driving voltage which is supplied to the at least one of the pair of base electrodes so that a reflection angle of light incident upon the mirror is controlled (See Fig.3, item100, in description See Col. 2, Lines 32-64).

Hornbeck does not show how to create an electrostatic attraction between the at least one of the pair of the base electrodes and a mirror, wherein the mirror is pivoted around an axis formed in lengthwise direction of the pair of the base (address) electrodes.

Tang et al. teaches how to drive an actuator in parallel to a substrate (See Fig. 1-3, items 36-38, in description See Col. 5, Lines 63-68 and Col. 4, Lines 51-53). It would have been obvious to the one ordinary skill in the art in the time of invention to use Tang et al. approach in the Hornbeck apparatus in order to reduce optical losses and relief of build-in residual strain.

As to claim 2, Hornbeck teaches about the pair of base (address) electrodes with protruding portion protruding inward to widen area that faces the girder (torsion hinge yoke) (See Fig. 4, 5, item 310, in description See Col. 7, Lines 44-45).

As to claim 3, Hornbeck teaches about the girder (torsion hinge yoke) with a support plate for supporting the second post, the support plate having connecting portions which protrude from sides of the support plate in a direction parallel to a lengthwise direction of the pair of base (address) electrodes and are point-symmetrical to each other on the basis of the second post, and

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a pair of springs which connect an upper surface of each of the pair of the first posts (the torsion beam support posts) to each of the connecting portions, wherein the pair of springs are elastically deformed when the mirror is vertically inclined by the electrostatic attraction between the mirror and the base (address) electrodes (See fig. 4, 5, items 114, 120, 122, 116, in description See Col. 7, Lines 7-10, Lines 46-67).

As to claim 4, Hornbeck teaches about landing (spring) tips protruding from opposite sides of the support plate (torsion hinge yoke), which contact landing pad (dielectric layer) during pivoting (See Fig. 4, 5, items 128, 328, in description See Col. 7, Lines 62-64).

As to claim 5, Hornbeck teaches about dielectric layer 328, which prevents adhesive contact with the pair of base (address) electrodes (See Fig. 4, 5, items 328, 128, in description See Col. 7, Lines 62-64).

As to claim 6, Hornbeck teaches about the girder (torsion hinge yoke) with a support plate for supporting the second post, the support plate having connecting portions which protrude from sides of the support plate in a direction parallel to a lengthwise direction of the pair of base (address) electrodes and are point-symmetrical to each other on the basis of the second post, and a pair of springs which connect an upper surface of each of the pair of the first posts (the torsion beam support posts) to each of the connecting portions, wherein the pair of springs are elastically deformed when the mirror is vertically inclined by the electrostatic attraction between the mirror and the base (address) electrodes (See fig. 4, 5, items 114, 120, 122, 116, in description See Col. 7, Lines 7-10, Lines 46-67).

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As to claim 7, Hornbeck teaches about landing (spring) tips protruding from opposite sides of the support plate (torsion hinge yoke), which contact landing pad (dielectric layer) during pivoting (See Fig. 4, 5, items 128, 328, in description See Col. 7, Lines 62-64).

As to claim 8, Hornbeck teaches about the pair of base (address) electrodes with protruding portion protruding inward to widen area that faces the girder (torsion hinge yoke) (See Fig. 4, 5, item 310, in description See Col. 7, Lines 44-45).

As to claim 9, Hornbeck teaches about the mirror is pivoted around an axis that is parallel to a lengthwise direction of the pair of base electrodes (See Fig. 4, 5, items 310, 102, in description See Col. 2, Lines 53-61).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- The Drake et al. (US Patent No. 6,128,122) reference discloses a micromachined mirror with stretchable restoring force member.
- The Hornbeck (US Patent No. 5,535,047) reference discloses an active yoke hidden hinge digital micromirror device.
- The Chin et al. (US Patent No. 5,670,977) reference discloses a spatial light modulator having single bit-line dual-latch memory cells.

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- The Hornbeck. (US Patent No. 5,784,212) reference discloses a method of making a support post for a micromechanical device.
- The Chin et al. (US Patent No. 6,404,534 B1) reference discloses a micro-mirror device and driving method.
- The Lee (US Patent Application Publication No.: US 2002/0054415 A1) reference discloses a optical scanner ... and method of driving the laser image projector.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonid Shapiro whose telephone number is 703-305-5661. The examiner can normally be reached on 8 a.m. to 5 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on 703-305-4938. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4750.

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July 25, 2002



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